***Teacher Notes – KEY***

**CW#73H:** Scale Factors

Honors Geometry

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| **CRS** | MEA 701 - Use scale factors to determine the magnitude of a size change  PPF 702 - Solve multi-step geometry problems that involve integrating concepts, planning, visualization, and/or making connections |
| **Objective** | 12.4 Use a given scale factor to compare the relationship of two figures or distance  12.5 Find area or volume when necessary to convert dimensions of a figure to different units |

1. **Unit Conversions**

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| **Distance Conversions** | |
| \_\_\_\_\_\_\_\_\_\_ inches = \_\_\_\_\_\_\_\_\_\_ foot  \_\_\_\_\_\_\_\_\_\_ centimeters = \_\_\_\_\_\_\_\_\_\_ meter  \_\_\_\_\_\_\_\_\_\_ feet = \_\_\_\_\_\_\_\_\_\_ yard | |
| Example:  The length of a soccer field is 90 meters. What is the length in centimeters? | YOU TRY!  1. The distance between two buildings on the street is 180 feet. What is the distance in yards? |
| YOU TRY!  2. The width of a classroom whiteboard is 15 feet. What is the length in inches? | YOU TRY!  3. The diameter of a hula hoop is 200 centimeters. What is the diameter in meters? |
| **Area Conversions** | |
| \_\_\_\_\_\_\_\_\_\_ inches2 = \_\_\_\_\_\_\_\_\_\_ foot2  \_\_\_\_\_\_\_\_\_\_ centimeters2 = \_\_\_\_\_\_\_\_\_\_ meter2  \_\_\_\_\_\_\_\_\_\_ feet2 = \_\_\_\_\_\_\_\_\_\_ yard2 | |
| Example:  The area of a table top is 720 inchessquared. What is the area in feet? | YOU TRY!  4. The dimensions of a room are 10 feet by 9 feet. What is the area of the room in inches? |
| YOU TRY!  5. The area of a football field is 5,000 yards squared. What is the area in feet? | YOU TRY!  6. A basketball court is 20 yards by 15 yards. What is the area of the court in feet? |

1. **Scale Factors**

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| **Review & Tips** |
| 1. In word problems, the wording **matters**.   Ex: There are 14 girls and 11 boys in the class.   1. What is the ratio of boys to girls? 2. What is the ratio of girls to boys? 3. **Unlike unit conversions**, when setting up ratios for scale factor problems, you are not “canceling” out units, but setting up equivalent ratios. So you want units to be the same on the top and bottom of fractions.   Ex: A football field is 3,000 square yards. What is its area in feet?  Ex: On a map, 1 inch is equal to 50 miles. If Chicago to South Bend is 92 miles, how many inches apart will they be on the map? |

**Example Problems**

**Unit Conversions & Scale Factors**

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| **Example 1:**  Brandon is going to cover his bathroom with tiles, and he plans to but the tiles next to each other so there is no space in between them. The tiles are rectangular prisms that are 2 centimeters tall by 10 centimeters wide by 8 centimeters long. If Brandon’s bathroom is a square that measures 4 meters by 4 meters, what is the minimum number of tiles he will need to fully cover his bathroom floor? | |
| **Example 2:**  A thumbnail of a photographer’s image shows a certain skyscraper to be 5 centimeters tall. In actuality the skyscraper is 400 meters tall. What is the scale factor of the building to the thumbnail? | **Example 3:**  The Jones family was planning on taking a road trip from Chicago to Madison, WI, which is 500 miles. Instead, they decided to go to Springfield, IL, which is 630 miles from Chicago. On a certain map, each inch equals 60 miles. On that map, how much longer is the trip to Springfield than the trip to Madison? |

**Independent Practice Problems**

**Unit Conversions & Scale Factors**

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| 1) A traveling salesman lives in City A, but needs to go to City B and City C. His map indicates that 2 centimeters is equal to 100 miles. On the map, City B is 5 cm away from City A, and City C is 4 cm away from City A. In miles, how much further away is City B than City C? | 2) The floor plan of a house is drawn to scale such that .25 in. = 1 ft. The master bedroom measures 3 inches by 3.75 inches on the blueprints. What is the actual size of the room? |
| 3) The blueprints of a large building are drawn such that 4 centimeters represents 700 meters.   1. What is the scale factor of the actual building to the blueprint? 2. What is the scale factor of the blueprint to the actual building? | 4) The Jenner family was planning on taking a road trip from Chicago to Milwaukee, WI, which is 250 miles. Instead, they decided to go to Springfield, IL, which is 630 miles from Chicago. On a certain map, each inch equals 50 miles. On that map, how much longer is the trip to Springfield than the trip to Milwaukee? |
| 5) A thumbnail of a photographer’s image shows a certain skyscraper to be 5 centimeters tall. In actuality the skyscraper is 600 meters tall. What is the scale factor of the building to the thumbnail? | 6) The James family was planning on taking a road trip from Chicago to Bloomington, IN, which is 700 miles. Instead, they decided to go to Peoria, IL, which is 530 miles from Chicago. On a certain map, each inch equals 50 miles. On that map, how much longer is the trip to Bloomington than the trip to Peoria? |
| 7) Michael is going to cover his hallway with carpet. The carpet will come in strips that measure 16 inches by 18 inches. Michael plans to staple the strips of carpet down so there is no space in between them. If Michael’s hallway is 10 feet by 6 feet, what is the minimum number of strips that he will need to fully cover his hallway? | 8) A property owner wants to build a wall in the backyard that will be 6 feet by 10 feet. He has bricks that are 4 inches wide, 2 inches tall, and 8 inches long. How many bricks will he need to lay in order to build this wall? |
| 9) In a photograph, Dan is 4.5 inches tall, and his sister Emma is 3.5 inches tall. Dan’s actual height is 90 inches. What is Emma’s actual height? | 10) John rode 20 yards on his bike. Stephanie rode 230 feet. Who rode a further distance? |

**Exit Slip**

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| 1) A model sailing ship is 10 inches long. In actuality, the sailing ship is 160 feet long.   1. What is the scale factor of the actual sailing ship to the model? 2. What is the scale factor of the model to the actual sailing ship? | 2) Jonathan is going to cover his basement with linoleum strips that measure 1 foot by 3 feet. He plans to lay the strips next to each other so there is no space in between them. If Jonathan’s basement is 6 yards by 5 yards, what is the minimum number of linoleum strips that he will need to fully cover his basement? |

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